Processing Chlorophyll-a at the DAC level

ACTION 3

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Introduction

The measurements :

-Part of the photons absorbed by a chlorophyll-a molecule in the blue part of the spectrum is re-emitted as less energetic photons in the red part
- Fluorescence measurements are converted to chlorophyll-a concentrations thanks to laboratory or in-situ fluorometer calibrations

This method is widely used for shipboard measurement (mainly through fluorometers mounted on CTD rosette) and is also the one used onboard floats

=> fluorescence of the chlorophyll-a is (with oxygen) the most measured biological property in the open ocean

Recommendations for addressing the Chlorophyll-a processing

-The official Bio-Argo unit for chlorophyll-a concentration is mg/m^3

-Store any data transmitted by the chlorophyll-a fluorometer with meaningful names.
The proposed name for the counts transmitted by the fluorometer is "CHLA_RAW".

-Store in "CHLA" the chlorophyll-a concentration in mg/m^3 , estimated from the "CHLA_RAW" counts.

-Fill properly the metadata to document the calibration, the conversions equations and the fields to identify a sensor.

ECO sensor : Measurements and Data processing

Raw data from the ECO chlorophyll-a fluorometer (CHLA_RAW) are transmitted as counts, ranging from 0 to 4120 +/- 5.
The basic equation allowing the retrieval of Chlorophyll-a concentration from raw transmitted measurement is:

$$CHLA = (CHLA\_RAW – DARK\_CHLA) * SCALE\_CHLA$$

where

- CHLA = concentration of chlorophyll-a of a sample of interest (mg/m^3)
- CHLA_RAW = raw counts output when measuring a sample of interest
- DARK_CHLA= dark counts, the measured signal output of the fluorometer in clean water with black tape over the detector
- SCALE_CHLA= multiplier in mg/m^3/counts

The scale factor (SCALE_CHLA), dark counts (DARK_CHLA) are on the instrument's characterization sheet, supplied by WET Labs and will be stored in the « PREDEPLOYMENT_CALIB_EQUATION » and in the « PREDEPLOYMENT_CALIB_COEFFICIENT » .

ECO sensor : Sensor metadata

Sensors and measurements method	
SENSOR	Fluorometer
SENSOR MAKER	WET labs
SENSOR_MODEL	ECO
SENSOR_SERIAL_NUMBER	To be filled :2423
SENSOR_UNITS	Counts
SENSOR_ACCURACY	0.08 mg/m^3
SENSOR_RESOLUTION	0.025 mg/m^3

ECO sensor : Chlorophyll-a related parameters

Raw data from the ECO sensor is output in counts (CHLA_RAW) from the sensor.

PARAMETER="CHLA_RAW"

PREDEPLOYMENT_CALIB_EQUATION="none"

PREDEPLOYMENT_CALIB_COEFFICIENT="none"

PREDEPLOYMENT_CALIB_COMMENT="Uncalibrated chlorophyll-a fluorescence measurement".

This CHLA_RAW is converted in chlorophyll-a concentration (CHLA)

PARAMETER="CHLA"

PREDEPLOYMENT_CALIB_EQUATION="CHLA=(CHLA_RAW-DARK_CHLA)*SCALE_CHLA"

PREDEPLOYMENT_CALIB_COEFFICIENT="DARK_CHLA=71 , SCALE_CHLA=0.008"

PREDEPLOYMENT_CALIB_COMMENT=""